Amendments in the claims:

1. (canceled)

2. (Currently amended) The estimation method of claim 18 ~~1~~, wherein said sensor is a photodiode and said illumination indication is a charge accumulated from photocurrent produced by said photodiode.

3. (Currently amended) The estimation method of claim 18 2, wherein said measuring step occurs ~~occurring~~ non-destructively and said charge accumulates ~~accumulating~~ over said exposure period.

4. (canceled)

5. (Currently amended) The estimation method of claim 18 ~~1~~, wherein said determining ~~step including~~ includes statistical signal processing of said multiplicity of measurements, said signal processing being based on maximizing a likelihood of accuracy of said estimated illumination.

6. (Currently amended) The estimation method of claim 18 ~~1~~, wherein said determining ~~step including~~ includes statistical signal processing of said multiplicity of measurements, said signal processing being based on minimizing an error of said estimated illumination.

7. (Currently amended) The estimation method of claim 18 ~~1~~, wherein said determining ~~step including~~ includes statistical signal processing of said multiplicity of measurements, said signal processing being based on minimizing a linear mean square error of said estimated illumination.

8. (Currently amended) The estimation method of claim 18 ~~1~~, wherein said sensor is configured in a sensor array, a pixel sensor in a digital camera, a pixel sensor in a video camera, a pixel sensor in a stereo digital camera or a pixel sensor in a stereo video camera.

9. (canceled)

36. (canceled)

10-16. (canceled)

17. (Currently amended) An estimation method for recursively estimating an optimal illumination on a sensor capable of capturing non-destructively a plurality of image samples during an exposure period, said method comprising:

measuring an illumination indication from said sensor, said measuring occurs two or more times at intervals during said exposure period, producing a multiplicity of measurements;

determining an estimated illumination on said sensor from all or essentially all of said multiplicity of measurements non-

destructively captured before motion/saturation, said determining step occurring recursively over said multiplicity of measurements and including statistical signal processing of said multiplicity of measurements, said signal processing being based on a noise model selected from a fixed pattern noise model, a reset noise model, a shot noise model and a read noise model; and

~~The estimation method of claim 16 further comprising a step of~~ maintaining a plurality of parameters during said measuring step, said plurality of parameters comprising:

said estimated illumination;

~~means for weighing~~ a weighting coefficient of a particular one of said multiplicity of measurements;

~~means for indicating~~ a variance between said particular one of said multiplicity of measurements and said multiplicity of measurements; and

~~means for indicating~~ an overall variance of said multiplicity of measurements.

18. (Currently amended) An estimation method for recursively estimating an optimal illumination on a sensor capable of capturing non-destructively a plurality of image samples during an exposure period, said method comprising:

measuring an illumination indication from said sensor, said measuring occurs two or more times at intervals during said exposure period, producing a multiplicity of measurements;

determining an estimated illumination on said sensor from all or essentially all of said multiplicity of measurements non-destructively captured before motion/saturation, said determining step occurring recursively over said multiplicity of measurements and including statistical signal processing of said multiplicity of measurements, said signal processing being based on a noise model selected from a fixed pattern noise model, a reset noise model, a shot noise model and a read noise model; and

~~The estimation method of claim 16 further comprising a step of~~ maintaining a plurality of parameters during said measuring step, said plurality of parameters comprising:

said estimated illumination;

a weighting coefficient applied to a difference between a present one of said multiplicity of measurements and said estimated illumination corresponding to a previous one of said multiplicity of measurements;

a mean square error of said estimated illumination; and

a covariance of said estimated illumination with said present one of said multiplicity of measurements.

19. (Currently amended) The estimation method of claim 17 ~~16~~, wherein said sensor is a photodiode and said illumination indication is a charge accumulated from photocurrent produced by said photodiode.

20. (Currently amended) The estimation method of claim 17 ~~16~~, wherein said measuring occurs ~~step occurring~~ non-destructively and said charge accumulates ~~accumulating~~ over said exposure period.

21. (Currently amended) The estimation method of claim 17 ~~16~~, wherein said determining ~~step~~ includes ~~including~~ statistical signal processing of said multiplicity of measurements, said signal processing being based on maximizing a likelihood of accuracy of said estimated illumination.

22. (Currently amended) The estimation method of claim 17 ~~16~~, wherein said determining ~~step~~ includes ~~further comprising~~ statistical signal processing of said multiplicity of measurements, said signal processing being based on minimizing an error of said estimated illumination.

23. (Currently amended) The estimation method of claim 17 ~~16~~, wherein said determining ~~step~~ includes ~~further comprising~~ statistical signal processing of said multiplicity of measurements, said signal processing being based on minimizing a linear mean square error of said estimated illumination.

24. (Currently amended) The estimation method of claim 17 ~~16~~, wherein said sensor is configured in a sensor array, a pixel sensor in a digital camera, a pixel sensor in a video camera, a pixel sensor in a stereo digital camera or a pixel sensor in a stereo video camera.

25. (canceled)

26. (Currently amended) The apparatus of claim 33 ~~25~~, wherein said sensor is implemented in a sensor array, a pixel sensor in a single chip imaging device, a pixel sensor in a digital camera, a pixel sensor in a video camera, a pixel sensor in a stereo digital camera or a pixel sensor in a stereo video camera.

27. (Currently amended) The apparatus of claim 33 ~~25~~, wherein said sensor is a photodiode and said illumination indication is a charge accumulated from photocurrent produced by said photodiode.

28. (Currently amended) The apparatus of claim 33 ~~27~~, wherein said sampling means operates non-destructively and said charge accumulates over said exposure period.

29. (Currently amended) The apparatus of claim 33 ~~25~~, wherein said estimation means ~~being configured to~~ can perform statistical signal processing of said multiplicity of measurements, said signal processing being based on a noise model selected from a fixed pattern noise model, a reset noise model, a shot noise model and a read noise model.

30. (Currently amended) The apparatus of claim 33 ~~25~~, wherein said estimation means ~~being configured to~~ can perform statistical signal processing of said multiplicity of measurements, said signal processing being based on maximizing a likelihood of accuracy of said estimated illumination.

31. (Currently amended) The apparatus of claim 33 ~~25~~, wherein said estimation means ~~being configured to~~ can perform statistical signal processing of said multiplicity of measurements, said signal processing being based on minimizing an error of said estimated illumination.

32. (Currently amended) The apparatus of claim 33 ~~25~~, wherein said estimation means ~~being configured to~~ can perform statistical signal processing of said multiplicity of measurements, said signal processing being based on minimizing a linear mean square error of said estimated illumination.

33. (Currently amended) An apparatus configured to estimate illumination on a sensor during an exposure period, said apparatus comprising:

a sampling means configured to measure, at a multiplicity of time intervals during said exposure period, an illumination indication from said sensor, and configured to produce a multiplicity of measurements; and

an estimation means configured to determine an estimated illumination on said sensor from said multiplicity of measurements, said estimation means being configured to compute

recursively over said multiplicity of measurements and to maintain recursively a plurality of parameters over said multiplicity of measurements, said plurality of parameters comprising:

said estimated illumination;

~~means for weighing~~ a weighting coefficient of a particular one of said multiplicity of measurements;

~~means for indicating~~ a variance between said particular one of said multiplicity of measurements and said multiplicity of measurements; and

~~means for indicating~~ an overall variance of said multiplicity of measurements.

34. (Currently amended) An apparatus configured to estimate illumination on a sensor during an exposure period, said apparatus comprising:

a sampling means configured to measure, at a multiplicity of time intervals during said exposure period, an illumination indication from said sensor, and configured to produce a multiplicity of measurements; and

an estimation means configured to determine an estimated illumination on said sensor from said multiplicity of measurements, wherein said estimation means ~~being~~ is configured to perform statistical signal processing of said multiplicity of measurements, said signal processing being based on a noise model selected from a fixed pattern noise model, a reset noise model, a shot noise model and a read noise model, and wherein said estimation means ~~being~~ is configured to compute recursively

over said multiplicity of measurements and to maintain recursively a plurality of parameters over said multiplicity of measurements, said plurality of parameters comprising:

said estimated illumination;

a weighting coefficient applied to a difference between a present one of said multiplicity of measurements and said estimated illumination corresponding to a previous one of said multiplicity of measurements;

a mean square error of said estimated illumination; and

a covariance of said estimated illumination with said present one of said multiplicity of measurements.

35. (canceled)

37. (New) The apparatus of claim 34, wherein said sensor is implemented in a sensor array, a pixel sensor in a single chip imaging device, a pixel sensor in a digital camera, a pixel sensor in a video camera, a pixel sensor in a stereo digital camera or a pixel sensor in a stereo video camera.

38. (New) The apparatus of claim 34, wherein said sensor is a photodiode and said illumination indication is a charge accumulated from photocurrent produced by said photodiode.

39. (New) The apparatus of claim 34, wherein said sampling means operates non-destructively and said charge accumulates over said exposure period.

40. (New) The apparatus of claim 34, wherein said estimation means can perform statistical signal processing of said multiplicity of measurements, said signal processing being based on a noise model selected from a fixed pattern noise model, a reset noise model, a shot noise model and a read noise model.

41. (New) The apparatus of claim 34, wherein said estimation means can perform statistical signal processing of said multiplicity of measurements, said signal processing being based on maximizing a likelihood of accuracy of said estimated illumination.

42. (New) The apparatus of claim 34, wherein said estimation means can perform statistical signal processing of said multiplicity of measurements, said signal processing being based on minimizing an error of said estimated illumination.

43. (New) The apparatus of claim 34, wherein said estimation means can perform statistical signal processing of said multiplicity of measurements, said signal processing being based on minimizing a linear mean square error of said estimated illumination.

Comments on amendments to the claims

Independent claims 1, 9, 16, 25, and 35 are canceled.

Dependent claims 17 and 18 are rewritten in independent form.

Dependent claims 4, 10-15 and 36 are canceled.

Dependent claims 2-3 and 5-8 now depend from claim 18.

Dependent claims 19-24 now depend from claim 17.

Dependent claims 26-32 now depend from claim 33.

New claims 37-43 are presented, depending from claim 34. The further limitations of these claims are the same as the further limitations of claims 26-32, so no new matter or issue is thereby introduced.

In addition, minor informalities in the claims that have been noticed at this time are hereby corrected by amendment. Entry of these claim amendments is respectfully requested, as no new matter or new issue is introduced.

Detailed action: claim rejections under 35 USC 103

Claims 1-3, 8-11, and 15 stand rejected under 35 USC 103(a) as being unpatentable over US 2002/0012056 (hereinafter Trevino) in view of JP-63-201406 (hereinafter Yoshida).

Claim 1 is canceled. Claims 2-3 and 8 are amended to depend from allowable claim 18. Claims 10-11 and 15 are canceled.

Detailed action: claim rejections under 35 USC 103

Claims 4 and 36 stand rejected under 35 USC 103(a) as being unpatentable over Trevino in view of Yoshida in view of US 6,298,144 (hereinafter Pucker).

Claims 4 and 36 are canceled.

Detailed action: claim rejections under 35 USC 103

Claims 5-7 and 12-14 stand rejected under 35 USC 103(a) as being unpatentable over Trevino in view of Yoshida in view of US 5,600,731 (hereinafter Sezan).

Claims 5-7 are amended to depend from allowable claim 18. Claims 12-14 are canceled.

Detailed action: claim rejections under 35 USC 103

Claims 16, 19, 20 and 24 stand rejected under 35 USC 103(a) as being unpatentable over US 5,905,533 (hereinafter Hidari) in view of Yoshida.

Claim 16 is canceled. Claims 19, 20 and 24 are amended to depend from allowable claim 17.

Detailed action: claim rejections under 35 USC 103

Claims 21-23 stand rejected under 35 USC 103(a) as being unpatentable over Hidari in view of Yoshida in view of Sezan.

Claims 21-23 are amended to depend from allowable claim 17.

Detailed action: claim rejections under 35 USC 103

Claims 25-27 and 30-32 stand rejected under 35 USC 103(a) as being unpatentable over Trevino in view of Sezan.

Claim 25 is canceled. Claims 26-27 and 30-32 are amended to depend from allowed claim 33.

Detailed action: claim rejections under 35 USC 103

Claim 28 stands rejected under 35 USC 103(a) as being unpatentable over Trevino in view of Sezan in view of Yoshida.

Claim 28 is amended to depend from allowed claim 33.

Detailed action: claim rejections under 35 USC 103

Claim 29 stands rejected under 35 USC 103(a) as being unpatentable over Trevino in view of Sezan in view of Pucker.

Claim 29 is amended to depend from allowed claim 33.

Detailed action: claim rejections under 35 USC 103

Claim 35 stands rejected under 35 USC 103(a) as being unpatentable over Trevino in view of Pucker.

Claim 35 is canceled.

Detailed action: allowable subject matter

Claims 33 and 34 stand allowed, and claims 17-18 stand as allowable if rewritten in independent form.

Claims 17 and 18 are rewritten in independent form. New claims 37-43 are presented, depending on allowed claim 34.